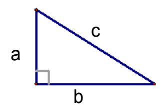
Peardeck warmup
7-1

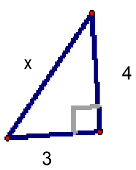
## 7.1 Apply the Pythagorean Theorem

Thm 7.1--The Pythagorean Theorem--In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the legs

$c^2 = a^2 + b^2$




President Garfield

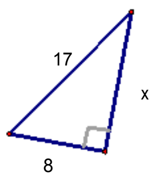



$x^2 = 3^2 + 4^2$

$\sqrt{x^2} = 9 + 16 = \sqrt{25}$

$x = \pm 5$

$5$



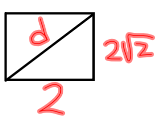

$17^2 = x^2 + 8^2$

$289 \quad\quad 64$

$225 = x^2$

$15$

Find the diagonal of the rectangle with width of 2 and a length of $2\sqrt{2}$



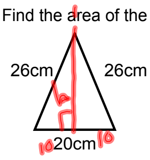

$d^2 = 2^2 + (2\sqrt{2})^2$

$4 + 8 \quad 4 \cdot 2$

$d^2 = 12$

$d = 2\sqrt{3}$

Find the area of the isosceles triangle.




$26^2 = h^2 + 10^2$

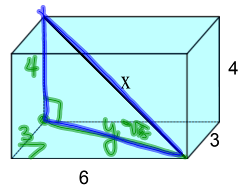
$576 = h^2$

$24 = h$

$A = \frac{1}{2}bh$

$\frac{1}{2} 20 \cdot 24$

$A = 240 \text{ cm}^2$




$y^2 = 6^2 + 3^2$
$y^2 = 45$
$x^2 = 4^2 + 45$
$x^2 = 61$
$x = \sqrt{61}$

Pythagorean Triples

3 4 5 5 12 13 8 15 17 7 24 25
6 8 10
9 12 15

7.2 Use the Converse of the Pythagorean Theorem

Theorem 7-2 The Converse of the Pythagorean Theorem--If the square of one side of a triangle is equal to the sum of the squares of the other two sides, then the triangle is a right triangle.

$c^2 = a^2 + b^2$ Right
$c^2 > a^2 + b^2$ Obtuse
$c^2 < a^2 + b^2$ Acute
c is largest $a + b > c$

Examples

3, 7, 8 $8^2 \overset{?}{>} 3^2 + 7^2$
obtuse $64 \quad 9 + 49$
$58$

8, 16, 17 $17^2 \overset{?}{} 8^2 + 16^2$
acute $289 < 64 + 256$

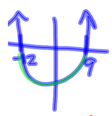
$\sqrt{5}$ $\sqrt{20}$ 6 $6^2 \overset{?}{} \sqrt{5}^2 + \sqrt{20}^2$
obtuse $36 > 25$

The sides and classification of a triangle given below. The length of the longest side is the integer given. What value(s) of x make the triangle?

ex 1: x, x, 12; acute

ex 2: 2x, 2x + 6, 30; obtuse

$30^2 > (2x)^2 + (2x+6)^2$
$900 > 4x^2 + 4x^2 + 24x + 36$
$900 > 8x^2 + 24x + 36$
$0 > 8x^2 + 24x - 864$
$0 > x^2 + 3x - 108$
$0 > (x+12)(x-9)$




$-12 < x < 9$

$\boxed{6 < x < 9}$

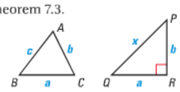
Restrictions
$2x > 0$ all sides exist?
$2x+6 > 0$ Is it a △?
$x > 0$
$x > -3$
$2x + 2x + 6 > 30$ $x > 6$
$4x > 24$
$x > 6$

ex 3: x+2, x+4, $\sqrt{10}$; obtuse

**40. PROVING THEOREM 7.3** Copy and complete the proof of Theorem 7.3.

**GIVEN ▶** In $\triangle ABC$, $c^2 < a^2 + b^2$ where $c$ is the length of the longest side.

**PROVE ▶** $\triangle ABC$ is an acute triangle.




**Plan for Proof** Draw right $\triangle PQR$ with side lengths $a$, $b$, and $x$, where $\angle R$ is a right angle and $x$ is the length of the longest side. Compare lengths $c$ and $x$.

| STATEMENTS | REASONS |
|---|---|
| 1. In $\triangle ABC$, $c^2 < a^2 + b^2$ where $c$ is the length of the longest side. In $\triangle PQR$, $\angle R$ is a right angle. | 1. _?_ |
| 2. $a^2 + b^2 = x^2$ | 2. _?_ |
| 3. $c^2 < x^2$ | 3. _?_ |
| 4. $c < x$ | 4. A property of square roots |
| 5. $m\angle R = 90°$ | 5. _?_ |
| 6. $m\angle C < m\angle$ _?_ | 6. Converse of the Hinge Theorem |
| 7. $m\angle C < 90°$ | 7. _?_ |
| 8. $\angle C$ is an acute angle. | 8. _?_ |
| 9. $\triangle ABC$ is an acute triangle. | 9. _?_ |

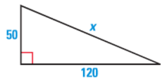
HW

p436-438 #s 3-5, 8,11-13, 24, 29

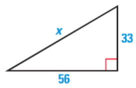
p444 #s 15-23

**ALGEBRA** Find the length of the hypotenuse of the right triangle.

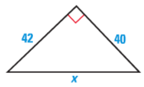
3.




4.



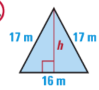

5.



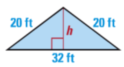

8.


**FINDING THE AREA** Find the area of the isosceles triangle.

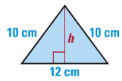
11.




12.

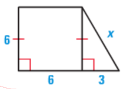



13.



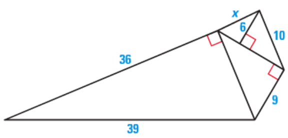

**FINDING SIDE LENGTHS** Find the unknown side length $x$. Write your answer in simplest radical form.

24.




**CHALLENGE** In Exercises 29 and 30, solve for $x$.

29.




**CLASSIFYING TRIANGLES** In Exercises 15–23, decide if the segment lengths form a triangle. If so, would the triangle be *acute, right,* or *obtuse?*

**15.** 10, 11, and 14 **16.** 10, 15, and $5\sqrt{13}$ **17.** 24, 30, and $6\sqrt{43}$

**18.** 5, 6, and 7 **19.** 12, 16, and 20 **20.** 8, 10, and 12

**21.** 15, 20, and 36 **22.** 6, 8, and 10 **23.** 8.2, 4.1, and 12.2